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Evaluation of Bacterial Contamination in Dental Unit Waterlines of Qazvin' Dental School, Iran

Mahshid Saffarpour [1]; Amir Peymani [2]; Sediegheh Rahrotaban [3]; Marjan Rahmani [1,*]; Meysam Ebrahimi [4]

[1]Department of Operative Dentistry, Qazvin University of Medical Sciences, Qazvin, IR Iran
[2]Department of Microbiology, Qazvin University of Medical Sciences, Qazvin, IR Iran
[3]Department of Pathology, Tehran University of Medical Sciences, Tehran, IR Iran
[4]Dental Faculty, Qazvin University of Medical Sciences, Qazvin, IR Iran

*Corresponding author: Marjan Rahmani, Department of Operative Dentistry, Qazvin University of Medical Sciences, Qazvin, IR Iran. Tel: +98-9122816484, E-mail: marjan_r_1362@yahoo.com

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Background: Contamination of dental unit waterlines is a well-known issue in the field of dentistry.
Objectives: This study was designed to evaluate contamination of dental unit waterlines by common gram positive and negative bacteria in Qazvin's dental school during the year 2012.
Materials and Methods: This survey was performed on 24 dental units routinely used in the dental school of the city of Qazvin. Four samples of 100 mL were obtained in sterile bottles from each unit at different work stages as follows: the beginning of daily activity, after flushing for 30 seconds, following two minutes of flushing, and after the end of daily practice. The number of bacterial colonies was determined for each sample and the mean colony number was calculated.
Results: Bacterial contamination was found in all 24 units at the beginning of daily activity with a mean colony count of 17850. The number of colonies decreased to 3250 following 30 seconds of flushing in 16 units and later to 1837 after flushing for two minutes in 13 units. In addition, the number of contaminated units at the end of daily activity was 19 with a mean colony number of 11170.
Conclusions: Flushing dental unit waterlines are an effective measure in reducing the number of bacterial contaminants.

Keywords: Gram Positive; Gram Negative; Biofilm; Colony Forming Unit assay

1. Background

Infection control in dentistry is one of the most important topics, which was initially introduced to address hepatitis and AIDS as two major global public health problems. Undoubtedly, specialists in the field of dentistry believe that investigation and research on the subject of infection transmission play a crucial role in designing better infection control measures and prevention strategies. Contamination of dental unit waterlines is a well-known concern, and can originate from either the patients or water supplies. Dental unit waterlines are suitable places for rapid formation and growth of various bacteria which accumulate on the inner surface of waterlines in high-speed hand pieces, turbines, air/water syringes, and ultrasonic scalers, leading to the generation of a thin layer of microorganisms called biofilm(1, 2). Biofilms are adherent colonies of bacteria, fungi, and protozoa, which are usually surrounded by a polymeric matrix (3, 4).

The formation of biofilm along dental unit waterlines was initially identified almost 40 years ago (5). The number of microorganisms present in biofilms is enormously high with most being pathogens. Biofilms contain a delicate protective coating, called glycocalyx, for the attachment of microorganisms and once generated for the first time, they act as a storage source for extensive growth of free microorganisms in waterlines. Biofilms are resistant to most antimicrobicidal agents, leading to the appearance of serious problems in controlling such organisms. Thus, the formation of biofilms eventually causes contaminated water flows into the waterlines of dental units (2). To prevent the transmission of infection to personnel and patients, improvement in the quality of output water associated with plumbing system or flush tank and dental unit waterlines must be vigorously considered (6).

2. Objectives

In this research, the contamination level of dental unit waterlines at four different departments of Qazvin Dental School was evaluated.

3. Materials and Methods

The bacteriological media used for the primary identification of bacteria were blood agar (BA) (Merck, Germany)